Computing

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Introduction

A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles on information and computation, how digital systems work and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate- able to use and express themselves, ande develop their ideas through information and communication technology- at a level suitable for the future workplace and as active participants in a digital world.

Aims

The national curriculum for computing aims to ensure that all pupils:

- Can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- Can analyse problems in computational terms and have repeated practical experience of writing computer programs in order to solve such problems
- Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- Are responsible, competent, confident and creative users of information and communication technology

Computing at Micklem

KS1

In years 1 and 2 at Micklem, children will be taught to understand what algorithms are, how they are implemented as programs on digital devices and that programs execute by following precise and unambiguous instructions. They have experience of creating and debugging their own programs and develop their ability to use logical reasoning to predict the behaviour of simple programs. They will learn to use technology purposefully to create, organise, store, manipulate and retrieve digital content, as well as recognising common uses of information technology beyond those in school. As part of a school focus, they will be taught and shown how to use technology safely and respectfully, keeping personal information private and knowing where to go for help and support when they have concerns about content or contact on the internet or other online technologies.

Pupils in key stage one will cover: Coding (with different outcomes), online safety, technology, presenting, searching for information, questioning and making music digitally

KS2

Building on their knowledge gained in KS1, pupils in years 3,4,5 and 6 at Micklem will be taught to design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems and solving problems by decomposing them into smaller parts. They will be able to use sequence, selection and repetition in programs as well as work with variables and various forms of input and output.They will further develop their ability to use logical reasoning to explain how some simple algorithms work and will and increase their skill in detecting and correcting errors in algorithms and programs. Pupils will be taught about computer networks (including the internet) and how these networks can provide multiple services and the opportunities they offer for communication and collaboration. Use of these technologies for searching effectively is also a focus, including an understanding of how results are selected and ranked and how to evaluate digital content. They will be introduced to a variety of software that they will be able to select from, use and combine on different digital devices to design and create a range of programs, systems and content for a purpose. This will include collecting, analysing, evaluating and presenting data and information. As a part of technology safety, pupils will be taught to use technology respectfully and responsibly, how to recognise acceptable and unacceptable behaviour and to identify a range of ways to report concerns about content and contact.

Pupils in key stage 2 will cover: Coding (with different outcomes), online safety, touch typing, blogging, email, word processing, spreadsheets, databases, hardware, 3d modelling, animation, music making, artificial intelligence and micro:bits

Curriculum Content and Sequence

Computing at Micklem-KS1 NC objectives	Autumn Term		Spring Term		Summer Term	
Year 1	**Unit 1.7- Coding** Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions Create and debug simple programs Use logical reasoning to predict the behaviour of simple programs	**Unit 1.6- Animated Stories** Use technology purposefully to create, organise, store, manipulate and retrieve digital content	**Unit 1.1- Online Safety** Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.	**Unit 1.5- Maze Explorers** Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions Create and debug simple programs Use logical reasoning to predict the behaviour of simple programs	**Unit 1.3 and 1.4- Pictograms and Lego Builders** Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions Use technology purposefully to create, organise, store, manipulate and retrieve digital content	**Unit 1.8 and 1.9- Spreadsheets and Technology** Recognise common uses of information technology beyond school

Computing at Micklem-KS1 NC objectives	Autumn Term		Spring Term		Summer Term	
Year 2	**Unit 2.1- Coding** Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. Create and debug simple programs Use logical reasoning to predict the behaviour of simple programs.	**Unit 2.5- Effective Searching** Use technology purposefully to create, organise, store, manipulate and retrieve digital content Recognise common uses of information technology beyond school	**Unit 2.2- Online Safety** Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.	**Unit 2.6- Creating Pictures** Use technology purposefully to create, organise, store, manipulate and retrieve digital content	**Unit 2.4- Questioning** Use technology purposefully to create, organise, store, manipulate and retrieve digital content	**Unit 2.7 and 2.8- Making Music and Presenting Ideas** Use technology purposefully to create, organise, store, manipulate and retrieve digital content

Computing at Micklem-LKS2 NC objectives	Autumn Term		Spring Term		Summer Term	
Year 3	**Unit 3.1- Coding** Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs	**Unit 3.9- Presenting** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information. Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	**Unit 3.2- Online Safety** Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	**Unit 3.4- Touch Typing** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 3.6- Branching Databases and Graphing** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 3.5- Email** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information. Understand computer networks, including the Internet; how they can provide multiple services, such as the World Wide Web; and the opportunities they offer for communication and collaboration. Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

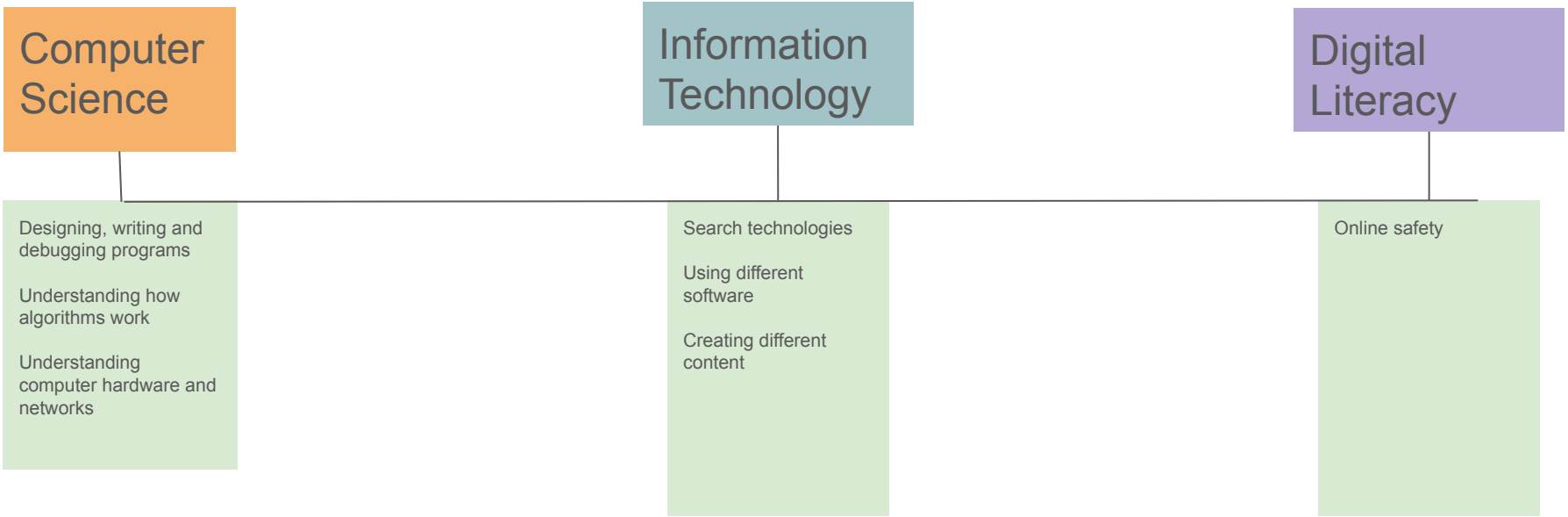
Computing at Micklem-LKS2 NC objectives	Autumn Term		Spring Term		Summer Term	
Year 4	**Unit 4.1.- Coding** Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 4.9-Music Making** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 4.2- Online Safety** Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. Understand computer networks, including the Internet; how they can provide multiple services, such as the World Wide Web; and the opportunities they offer for communication and collaboration.	**Unit 4.6- Animation** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 4.3- Spreadsheets** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 4.8- Hardware Investigators** **Unit 4.10- Artificial Intelligence** **Unit 3.10- Micro:bits** Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information. Understand computer networks, including the Internet; how they can provide multiple services, such as the World Wide Web; and the opportunities they offer for communication and collaboration.

Computing at Micklem-UKS2 NC objectives	Autumn Term		Spring Term		Summer Term	
Year 5	**Unit 5.1- Coding** Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information	**Unit 5.8- Word Processing** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information	**Unit 5.2- Online Safety** Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. Understand computer networks, including the Internet; how they can provide multiple services, such as the World Wide Web; and the opportunities they offer for communication and collaboration.	**Unit 5.6- 3D Modelling** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information	**Unit 5.4- Databases** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information	**Unit 5.5- Game Creator** **Unit 3.10- Micro:bits** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Computing at Micklem-UKS2 NC objectives	Autumn Term		Spring Term		Summer Term	
Year 6	**Unit 6.1- Coding** Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 6.7- Quizzing** Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.	**Unit 6.2- Online Safety** Use technology safely, respectfully and responsibly; recognise acceptable/ unacceptable behaviour; identify a range of ways to report concern about content and contact Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration.	**Unit 6.4- Blogging** Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration. Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 6.9- Spreadsheets** Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	**Unit 4.11- Micro:bits** **Unit 6.5- Text Adventures** Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts Use sequence, selection and repetition in programs; work with variables and various forms of input and output. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Knowledge and Skills Progression

Components of Computing



Curriculum knowledge and skills progression

KS1	Computer Science	Information Technology	Digital Literacy
Year 1	**I understand that and algorithm is a set of instructions used to solve a problem or achieve an objective** I can debug a simple algorithm when the steps are out of order I can, with some assistance, fix problems with simple algorithms I can read code one line at a time and can predict what will happen when the code is run	**I can sort, collate, edit and store simple digital content**	I understand what technology is and can give examples in and out of school **I know the importance of keeping personal information such as usernames and passwords private** I can save my own work
Year 2	I can explain what an algorithm is I know why algorithms need to be precise **I can create a simple program for a purpose** I can identify and correct some errors in programs I can identify the parts of a program that respond to or initiate specific events or actions	I can organise data using a simple database I can perform simple searches I can edit digital data (music compositions) I can confidently create, name, save and retrieve content **I can use a range of media in my digital content (photos, text, sound)**	**I can retrieve relevant digital content using a search engine** I can share knowledge found using presenting software I can make links between the technology around and the work covered in school I know the implications to inappropriate online searches I am beginning to understand how things are shared electronically I know ways of reporting inappropriate behaviour and content

Curriculum knowledge and skills progression

KS1	Computer Science	Information Technology	Digital Literacy
Year 1	**I understand that and algorithm is a set of instructions used to solve a problem or achieve an objective** I can debug a simple algorithm when the steps are out of order I can, with some assistance, fix problems with simple algorithms I can read code one line at a time and can predict what will happen when the code is run	**I can sort, collate, edit and store simple digital content**	I understand what technology is and can give examples in and out of school **I know the importance of keeping personal information such as usernames and passwords private** I can save my own work
Year 2	I can explain what an algorithm is I know why algorithms need to be precise **I can create a simple program for a purpose** I can identify and correct some errors in programs I can identify the parts of a program that respond to or initiate specific events or actions	I can organise data using a simple database I can perform simple searches I can edit digital data (music compositions) I can confidently create, name, save and retrieve content **I can use a range of media in my digital content (photos, text, sound)**	**I can retrieve relevant digital content using a search engine** I can share knowledge found using presenting software I can make links between the technology around and the work covered in school I know the implications to inappropriate online searches I am beginning to understand how things are shared electronically I know ways of reporting inappropriate behaviour and content

LKS2	Computer Science	Information Technology	Digital Literacy
Year 4	I can turn a simple real-life situation into an algorithm for a program and my design shows I am thinking of the required task I can make more intuitive attempts to debug my own programs I can use timers for repetition I understand and can use 'IF' statements I can use variables and can order and manipulate the values I can make use of user inputs and outputs I can show that I am thinking about the structure of a program in logical, achievable steps more independently and use more knowledge of coding structures I can trace code and use step-through methods to identify errors in code and make logical attempts to correct **I can read programs with several steps and predict the outcome accurately** I know and can recognise the main component parts of hardware that allow computers to join to and from a network I have a growing understanding of the ways the internet provides methods of communication and the safety implications associated with this	I understand the function, features and layout of a search engine I can appraise selected webpages for credibility and information at a basic level I can make improvements to digital solutions based on feedback **I can make informed software choices when presenting information and data** I can create linked content I can share digital content	I can help others to understand the importance of online safety **I know a range of ways to report inappropriate content and contact**

UKS2	Computer Science	Information Technology	Digital Literacy
Year 5	I can turn a more complex real-life situation into an algorithm for a program **I can test and debug my programs as I go** I can use logical methods to identify the cause of any bug and with some assistance, can identify the specific line of code I can translate algorithms that include sequence, selection and repetition into code I can show that I am thinking about the structure of a program in logical, achievable steps more independently and use more knowledge of more complex coding structures I can combine sequence, selection and repetition with other coding structures I am beginning to think about my code structure in terms of the ability to debug and interpret the code later I understand the value of computer networks but also am aware of the dangers I know what personal information is and how this can be kept safe I can select the most appropriate form of online communications base on audience and digital content	**I can search with greater complexity for digital content using a search engine** I can explain in more detail about the credibility of a webpage and the information it contains I can make improvements to digital solutions based on feedback and can confidently comment on the success of the solution I can collaboratively create content and solutions using digital features I can use several ways to share digital content	I have a secure knowledge of online safety rules and can demonstrate safe and respectful use of a few different technologies and online services **I can relate appropriate online behaviour to my right to personal privacy and the mental wellbeing of myself and others**

Curriculum knowledge and skills progression

UKS2	Computer Science	Information Technology	Digital Literacy
Year 6	I can turn a more complex real-life situation into an algorithm for a program by identifying the important aspects of the taks (abstraction) I can decompose in a logical way using my knowledge of possible coding structures I can test and debug my programs as I go **I can use logical methods to identify the cause of any bug and can identify the specific line of code using a systematic approach** I can translate algorithms that include sequence, selection and repetition into code I can show that I am thinking about how to accomplish a set task in code utillising different structures, including nesting structures within each other I can show my understanding of variables in coding, outputs such as sound and movement and inputs from the user of the program I can interpret a program in parts and can make logical attempts to put the parts together to explain the program as a whole I can explain the difference between the internet and the world wide web in detail I know what a WAN and LAN are and how we access the internet in school	I can apply filters when searching for digital content I can explain in detail about the credibility of a webpage and the information it contains I can compare a range of digital content sources and rate them in terms of content quality and accuracy I can make improvements to digital solutions based on clear connections to an audience I can design and create my own blog **I can use criteria to evaluate the quality of digital solutions and can identify some solutions and make some refinements**	I can demonstrate the safe and respectful use of a range of different technologies and online services **I can identify more discreet inappropriate behaviours** I recognise the value in preserving their privacy when online for their own and other people's safety